

## TYPHOON HAL (14W)

Typhoon Hal was the second of eight significant tropical cyclones and the first of two typhoons to form in the western North Pacific during September. Hal combined with Typhoon Uleki (01C), Tropical Storm Irma (15W), and later with Tropical Storm Jeff (16W) to create the first three-storm situations of 1988 in the western North Pacific.

On 5 September the remnants of Gay (13W) dissipated east of Japan. In the central North Pacific Uleki (01C) churned west-northwestward from Hawaii and a large tropical upper-tropospheric trough (TUTT) low was situated northwest of Wake Island. Hal formed just west of Wake Island as a tropical disturbance induced by this TUTT low. At 050600Z, the system was first mentioned on the Significant Tropical Weather Advisory. Over

the next two days, the disturbance moved westward along the southern side of the subtropical ridge and became more organized. This growth prompted a Tropical Cyclone Formation Alert at 070430Z. Hal continued to organize. At 080000Z, the Alert was superseded by the first warning on Tropical Depression 14W, then upgraded (081200Z) to Tropical Storm Hal (Figure 3-14-1), when satellite intensity analysis indicated sustained surface winds of 35 kt (18 m/sec). Initially, Hal tracked west-southwestward, but eventually settled into a west-northwestward track as the subtropical ridge to its north weakened slightly. Hal continued to intensify and, at 101800Z, reached typhoon intensity.

Earlier at 101200Z, when Hal was 120 nm (222 km) northeast of Maug in the northern

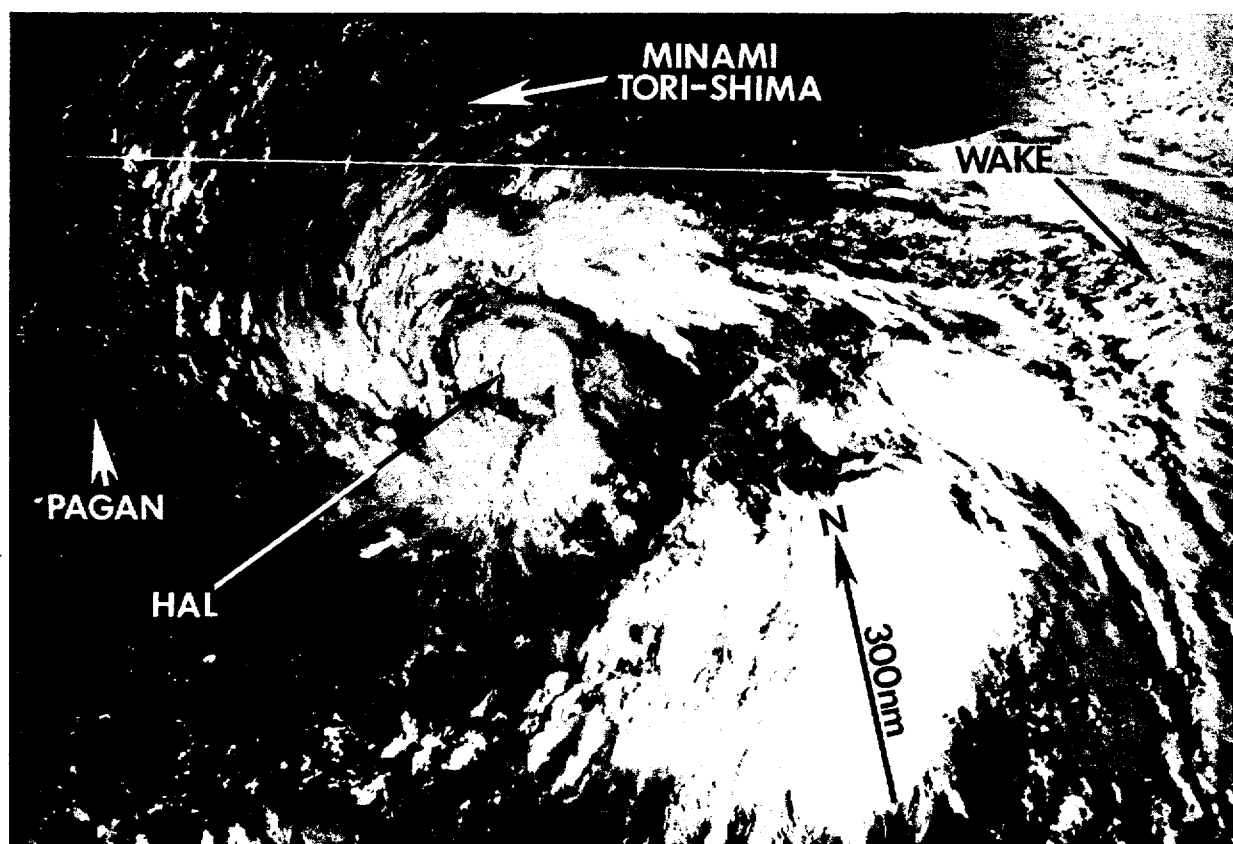


Figure 3-14-1. Hal shortly after being upgraded to a tropical storm (082128Z September NOAA visual imagery).

Marianas, the tropical cyclone started to decelerate and track to the southwest in response to stronger ridging to its north and west. After Typhoon Hal reached its peak intensity of 105 kt (54 m/sec) at 111200Z, it continued onward and passed over Maug, which is uninhabited, at 111800Z. On Guam (WMO 91212), 395 nm (732 km) to the south, the enhanced southwesterly inflow into Hal brought brisk surface winds with gusts to 40 kt (20 m/sec). Power outages and minor property damage were reported on the islands of Guam

and Saipan.

With a mid-latitude trough creating lower pressure-heights in the subtropical ridge north of the typhoon, Hal's direction of track changed to the north-northwest. Japan braced for the possibility of being affected by three tropical cyclones: Typhoon Hal (Figure 3-14-2), plus Tropical Storms Irma (15W) and Jeff (16W), which had developed southeast and southwest, respectively. During the next three days, Hal weakened, developed a large 60 nm

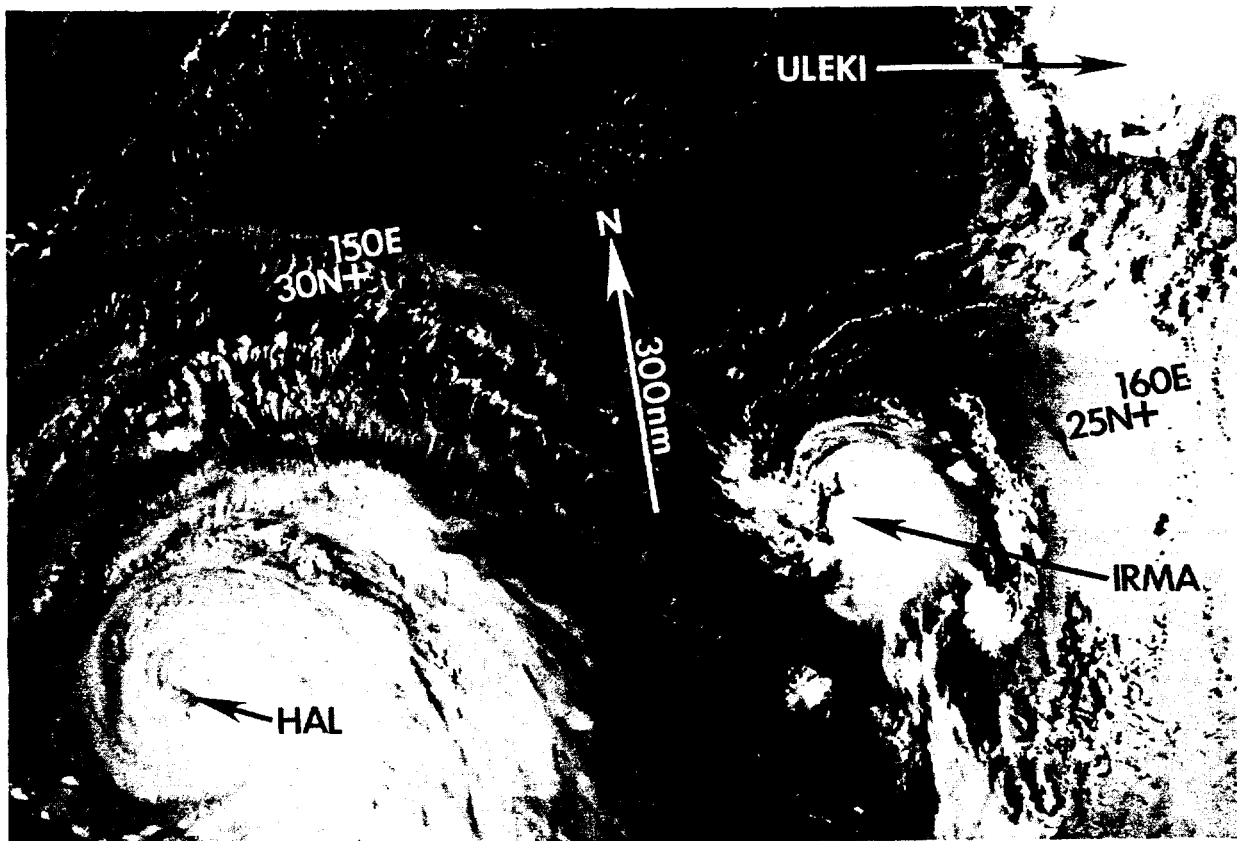


Figure 3-14-2. Typhoon Hal, at peak intensity. Also visible are Tropical Storms Irma (15W) and Uleki (01C) (122141Z September NOAA visual imagery).

(111 km) diameter eye and continued moving north-northwestward. At 150000Z, Hal (Figure 3-14-3) approached 32 degrees North latitude, started to recurve and accelerate. Typhoon Hal further weakened to 65 kt (33 m/sec) and made its closest point of approach - 195 nm (361 km) - to Tokyo, Japan at 151800Z. High surf caused several deaths and injuries along the coastal areas near Tokyo.

As Hal moved off to the northeast, its central convection was stripped away from its low-level circulation center by strong mid-latitude westerlies. When the final warning was issued at 170000Z, the system had weakened to 45 kt (23 m/sec), increased forward speed to 32 kt (59 km/hr) and was extratropical.

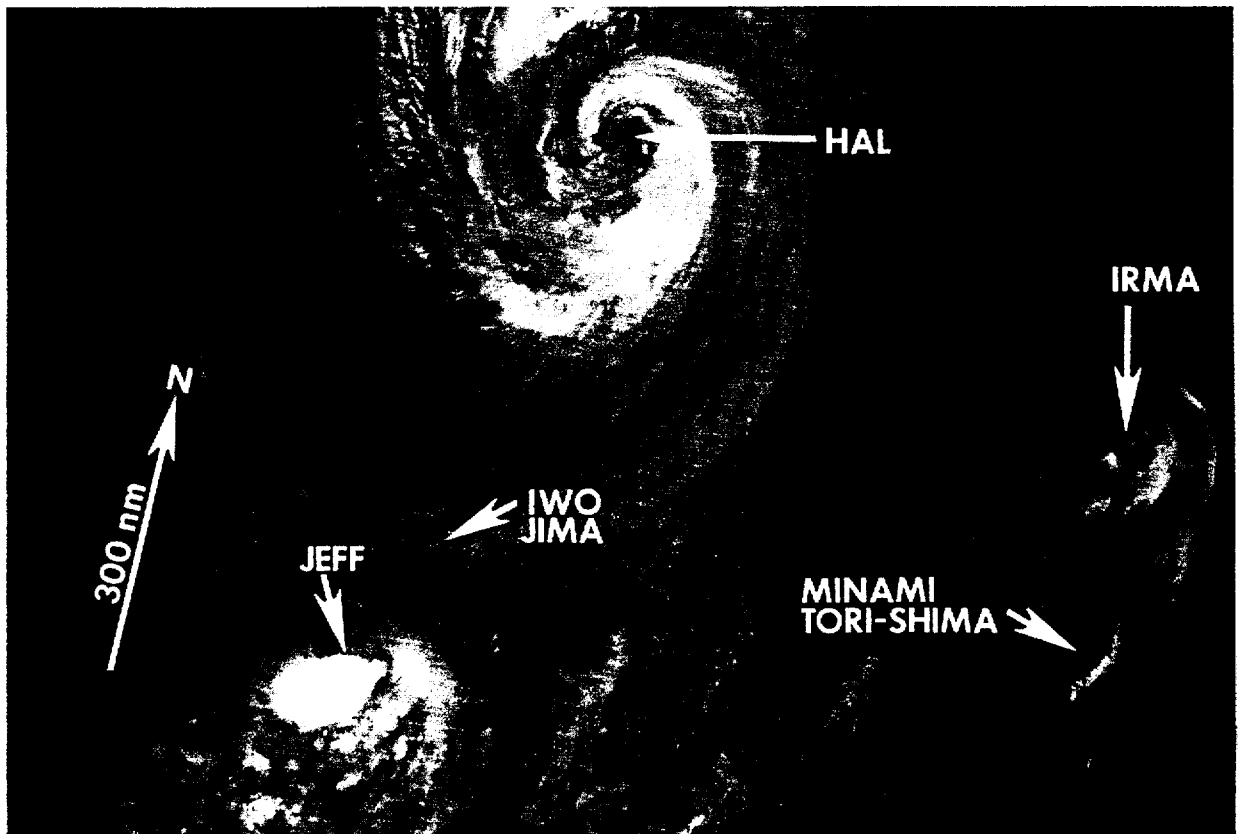


Figure 3-14-3. Typhoon Hal, Tropical Storms Irma (15W) and Jeff (16W) (150936Z September NOAA infrared imagery).